

Original Article

Frequency of Chest Complications after Liver Transplantation

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ABSTRACT

Background: Liver transplantation is a critical intervention for patients with advanced liver disease. However, postoperative complications, particularly pulmonary complications, significantly impact patient outcomes. Understanding these complications is essential for improving post-transplant care.

Objective: To investigate the prevalence and nature of pulmonary complications in liver transplant recipients and to identify potential risk factors associated with these complications.

Methods: This study was conducted at the Hepatobiliary and Liver Transplant Centre, Shaikh Zayed Hospital, Lahore, Pakistan, over a six-month period. A case series design with non-probability purposive sampling was employed. The sample size, determined using the WHO Sample Size Tool, was set at 100 participants, given logistical constraints. Data collection involved detailed postoperative assessments to identify pulmonary complications. The study included participants of all sexes and ages awaiting liver transplantation, excluding those undergoing a second transplant. Data analysis was performed using SPSS version 25.

Results: Out of 100 liver transplant recipients, 98.5% (n=128) presented with stable vital signs at the time of data collection, while 1.5% (n=2) were unstable. Discharge planning indicated 68.5% (n=89) under observation and 23.1% (n=30) with routine planning. In terms of education, 59.2% (n=77) had 10 years of education, and 16.9% (n=22) were illiterate. Donor health status was excellent in 98.5% (n=128) of cases. Pulmonary complications included respiratory infections (23.8%, n=31), pleural effusion (36.2%, n=47), atelectasis (15.4%, n=20), bronchospasm (7.7%, n=10), and pneumonia (9.2%, n=12).

Conclusion: The study highlights a significant incidence of pulmonary complications post-liver transplantation, with pleural effusion, respiratory infections, and atelectasis being the most common. These findings underscore the need for enhanced monitoring and proactive management of pulmonary complications in liver transplant recipients.

Keywords: Liver Transplantation, Pulmonary Complications, Postoperative Care, Pleural Effusion, Respiratory Infection, Atelectasis.

INTRODUCTION

In advanced liver cirrhosis cases, liver transplantation (LT) emerges as the pivotal therapeutic intervention for survival (1). Patients awaiting LT typically present with a deteriorated clinical state, a consequence of the severe underlying liver condition combined with the lengthy and intricate nature of their medical history. This preoperative condition, compounded by the extensive duration and complexity of the LT procedure, significantly escalates the risk of postoperative complications, especially respiratory dysfunctions. These complications are critical determinants of both acute and chronic postoperative morbidity and mortality rates, underscoring their clinical importance (2-5).

The duration of the surgery is a key factor; longer surgical times correlate with an increased risk of chest complications in LT recipients, exacerbating postoperative morbidity and mortality (6-8). Studies report a high incidence of these complications, with prevalence rates ranging between 63.9 to 87%. There is also a noted correlation with postoperative infections, further elevating mortality rates following LT (9-11). Contributing factors include prolonged disease progression, extended immobility, immunosuppressant usage, and various postoperative complications.

Despite widespread recognition of these issues globally, there was a significant gap in literature regarding post-LT pulmonary complications in Pakistan. Prior to our study, no extensive research in this context had been undertaken (6, 9-11). This lack of localized data propelled our investigation into the prevalence of chest complications post-LT in Pakistan. Through our study, we aimed

to identify the prevalence and types of chest complications, thereby contributing to the local medical literature. This research is crucial not only for academic purposes but also for practical applications. It lays the groundwork for enhancing medical care delivery for LT recipients in Pakistan, aiming to reduce the incidence of postoperative chest complications and improve overall patient outcomes.

MATERIAL AND METHODS

The research was conducted at the Hepatobiliary and Liver Transplant Centre, Shaikh Zayed Hospital, Lahore, Pakistan. Following the approval of the research synopsis, the study spanned a period of six months. The study employed a case series design, utilizing non-probability purposive sampling. The sample size determination was guided by the WHO Sample Size Tool, which, based on a 95% confidence level and a 9% margin of error, recommended a sample size of 120 participants. This calculation was based on the premise that 19.8% of liver transplant patients are likely to experience chest complications (8).

Considering the research setting, which is one of the few liver transplantation centers in the area, logistical factors such as assessment feasibility, time, and financial constraints were taken into account. Additionally, the typically short post-operative stays of recipients and the time limitations imposed by the project's educational nature were considered. Therefore, while the initial aim was to assess a predicted number of recipients, these constraints necessitated limiting the sample size to a maximum of 100 participants.

The inclusion criteria for the study encompassed participants of all sexes and various ages who were awaiting a liver transplant. The exclusion criteria specified individuals undergoing a second liver transplant and cases where the transplant recipient unfortunately passed away (12).

Data collection involved a comprehensive assessment of each participant, following their liver transplant procedure. This assessment was tailored to identify and document any occurrences of chest complications. The data analysis was conducted using SPSS version 25. This statistical software was employed to analyze the gathered data, allowing for a detailed evaluation of the prevalence and nature of chest complications among the study's participants. The analysis was performed retrospectively, adhering to the principles of objective and unbiased scientific inquiry, and all findings were documented in accordance with standard research methodologies and ethical guidelines.

RESULTS

The first graph, a pie chart, illustrates the gender distribution of patients undergoing liver transplantation. It reveals a striking disparity, with females constituting a vast majority of 86.15%, compared to only 13.85% of males. This significant gender imbalance

offers insights into the patient population served by the transplant program.

Moving to the central graph, the age distribution of donors is presented in a histogram, supplemented by a normal distribution curve in red. The data clusters around a mean age of 25.08 years, with a standard deviation of 4.924, indicating a relatively young donor pool. The histogram, with bins set in 5-year intervals, displays a bell-shaped curve characteristic of a normal distribution. This pattern suggests a common age range for donors, predominantly concentrated in the younger adult age group.

The final graph, another pie chart, focuses on the indications for liver transplantation. It depicts a predominant occurrence of cirrhosis, accounting for 86.15% of the cases, whereas hepatocellular carcinoma comprises 13.85%. This significant predominance of cirrhosis as an indication for liver transplantation highlights the critical impact of this condition on the need for such a complex medical intervention.

Figure 1 Gender, Donor's Age and Indication for Liver Transplantation

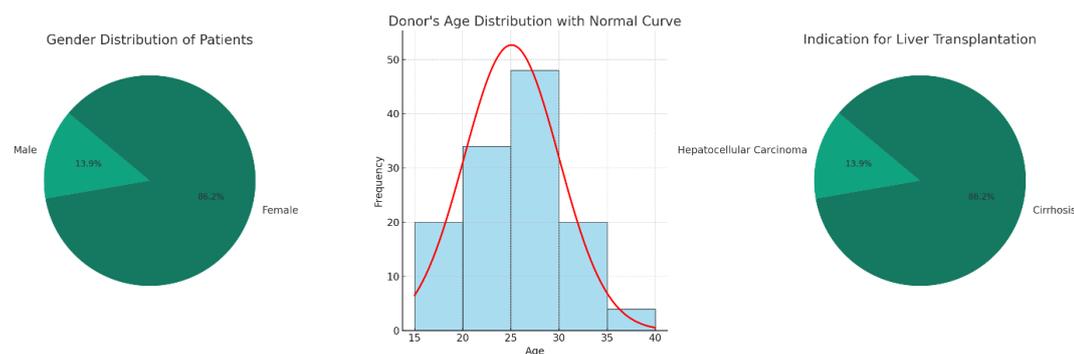


Table 1 Comprehensive Overview of Patient Demographics, Vital Signs, Donor Health Status, and Post-Transplant Complications in Liver Transplant Recipients

Category	Subcategory	Frequency	Percent (%)
Vital Signs at Data Collection	Stable	128	98.5
	Unstable	2	1.5
Discharge Planning	Routine Planning	30	23.1
	Under Observation	89	68.5
	Unusually Late	11	8.5
Patient Education	Illiterate	22	16.9
	10 Years Education	77	59.2
	12 Years Education	25	19.2
	14 Years Education	6	4.6
Donor Health Status	Excellent	128	98.5
	Average	2	1.5
Pulmonary Complications	Respiratory Infection	31	23.8
	Respiratory Failure	10	7.7
	Pleural Effusion	47	36.2
	Atelectasis	20	15.4
	Bronchospasm	10	7.7
	Pneumonia	12	9.2
Other Post-Transplant Complications	Cardiovascular	1	0.8
	Gastrointestinal (GIT)	11	8.5
	Neurological	2	1.5
	Other	116	89.2

The table presents a detailed overview of various aspects related to liver transplant patients, encompassing vital signs at data collection, discharge planning, patient education, donor health status, and post-transplant complications.

Regarding vital signs at the time of data collection, a vast majority of the patients, 128 out of 130 (98.5%), were found to be stable, while only 2 (1.5%) were unstable. In terms of discharge planning, the majority of patients, 89 (68.5%), were under observation, 30 (23.1%) had routine planning, and a smaller portion, 11 (8.5%), experienced unusually late discharge.

The educational background of the patients varied: 77 (59.2%) had 10 years of education, 25 (19.2%) had completed 12 years, 22 (16.9%) were illiterate, and only 6 (4.6%) had 14 years of education. This diverse educational profile reflects the wide range of backgrounds from which the patients came.

In terms of donor health status, the majority, 128 (98.5%), were in excellent health, while only 2 (1.5%) were average, indicating a generally healthy donor pool.

Pulmonary complications post-transplant were significant, with the most common being pleural effusion in 47 patients (36.2%), followed by respiratory infection in 31 (23.8%), atelectasis in 20 (15.4%), pneumonia in 12 (9.2%), respiratory failure and bronchospasm each in 10 patients (7.7%).

Other post-transplant complications were predominantly categorized as 'Other', affecting 116 patients (89.2%). Specific complications included gastrointestinal issues (GIT) in 11 patients (8.5%), neurological complications in 2 (1.5%), and cardiovascular complications in 1 patient (0.8%).

DISCUSSION

The discussion of our study reveals critical insights into the pulmonary complications following liver transplantation, a topic that has been sporadically addressed in previous literature (2, 13, 14). Notably, pneumonia has emerged as a significant life-threatening postoperative complication (15, 16). The findings underscore the importance of prophylactic antibiotic treatments, especially for high-risk patients, to prevent infectious pulmonary issues. It is imperative for physicians to meticulously monitor patients exhibiting post-surgery pulmonary complications for signs of infection (17-19). The immediate and effective management of infections is crucial in mitigating mortality and morbidity associated with pulmonary consequences.

Our study identified several factors that increase the likelihood of developing pneumonia in patients undergoing liver transplantation from cadaveric donors. These include piggyback anastomosis, ventilator support, non-infectious lung abnormalities, and respiratory edema. Additionally, elevated overall bilirubin levels and a history of acute rejection emerged as distinct risk indicators for pneumonia. The complexity of these prognostic indicators varied across different patient populations. Interestingly, there was a lower incidence of pulmonary complications following complete cadaveric liver transplantation compared to partial liver graft transplantations. However, our study could not conclusively determine the contributing factors to this difference, including the role of piggyback anastomosis. Despite the minimal risk of contracting pneumonia in liver transplant patients, its manifestation correlated with a significant fatality rate. This observation highlights the critical need for prompt identification and aggressive treatment to reduce pulmonary complications and subsequent mortality in high-risk patients (20, 21).

Previous studies have reported various rates of pulmonary complications post-transplantation. Pulmonary edema, a type of pulmonary infiltration, occurred in 40% of patients, atelectasis in 10%, pneumonia in 38%, and acute respiratory distress syndrome (ARDS) in 8%. Within the first 30 days post-transplant, 48% of patients experienced infiltrations. Notably, patients receiving mechanical ventilation accounted for a significant majority of pulmonary infiltrate cases (78%) and pneumonia cases (87%) in intensive care units (22, 23).

Another study reported an overall chest complication rate of 19.8% (n=144), with a mortality rate of 44.9%, including 28.7% during hospitalization and 16.2% post-discharge. The spectrum of complications included chest infections (15%), effusions (2.4%), pneumothoraxes (1.2%), and pulmonary embolisms (1.2%) (24). These findings align with our study, where out of 130 patients (100%) with chest/pulmonary complications at data collection, 31 (23.8%) had respiratory infections, 47 (36.2%) had pleural effusion, 20 (15.4%) had atelectasis, 10 (7.7%) had respiratory failure, 10 (7.7%) had bronchospasm, and 12 (9.2%) had pneumonia.

The present study reinforces the notion that pleural infection, atelectasis, and pleural effusion are more likely to occur as chest complications following liver transplantation. However, pneumonia and respiratory failure, while less frequent, pose significant health risks. These findings necessitate increased vigilance and a proactive approach to evaluating chest complications in the initial postoperative period.

One limitation of this study is the relatively small sample size, which hinders the ability to establish statistically significant findings. This limitation calls for further research with larger cohorts to validate and expand upon our findings. Moreover, future studies should focus on identifying and quantifying the various factors contributing to post-transplant pulmonary complications. This approach will not only aid in understanding the underlying mechanisms but also in developing targeted interventions to improve patient outcomes post liver transplantation.

CONCLUSION

In conclusion, this study provides vital insights into the pulmonary complications following liver transplantation, highlighting the prevalence of conditions such as pleural infection, atelectasis, pleural effusion, pneumonia, and respiratory failure. The findings emphasize the need for enhanced prophylactic strategies, especially for high-risk patients, and underscore the importance of vigilant postoperative monitoring for early detection and management of pulmonary issues. Although limited by its relatively small sample size, this research underscores the imperative for larger-scale studies to corroborate these findings and further explore the contributing factors. The implications of this study are significant for clinical practice, as they advocate for a more proactive and tailored approach in managing liver transplant patients. This approach could potentially reduce the incidence of severe pulmonary complications, thereby improving the overall outcomes and quality of life for these patients.

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